Direct Video: An Electronic Artform for Color TV

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Introduction

Within mankind's tools are latent properties which often remain unutilized. Television is no exception. As an electronic system its range of impact and complexity are astonishing, more so than its usual content indicates. It is possible, however, to go one step further than television might seem to permit and remove the TV camera, replacing it with electronic circuits which can be manipulated to effect the formation of an image on a video monitor. This is direct video synthesis, an electronic means of evoking images from within the television system. It presents the videographer with a method of using television as a medium of personal expression. (Fig. 1 to 4)

Genesis of the Direct Video Synthesizer

I was led to color television in the search for a precise, electronic means for expressively controlling light. Many graphic displays which are available seemed costly and neglected a common piece of display hardware -- the color television set. Hence arose the notion of a visual synthesizer, designed to display directly in a color video format. It remained, however, to formulate an aesthetic model upon which to base the engineering of image-forming circuit modules which would constitute the synthesizer.

Aesthetic Model

The synthesized image is built up of parallel (in time) layers of image information. An image is modeled to consist of elements of form, motion, texture, and color. (A mathematical development of form as points, lines, planes, and perspective illusions serves as a preconditioner for electronically realising this element in two dimensions.) The temporal change of geometrical relationships between elements of form gives rise to motion. Texture arises in several manners; for example, as brightness gradients over elements of form, or as aggregates of microforms, and also dynamically. The spectral distribution of reflected and radiant energy of forms evokes color from our perceptions.

Implementing the Model: Outline of the Synthesizer

Mapping from the aesthetic model into real electronic control of video images is summarized here:

1) sequences of pulse-width modulated signals are developed which define two dimensional contours of form over the monitor surface;

2) waveshaping and amplitude modulation of these signals allows control of the brightness gradient, yielding texture;

3) proportional distribution of these signals as excitation for the primary pigments of emitted light, red, green, and blue, produces a gamut of colors with hue, saturation and luminance specified precisely.

I have constructed a prototype synthesizer (see Figure 5) utilizing this process which consists of circuit and control modules that function directly on a scanned raster basis. A controlled-voltage parameter approach has been employed to direct the image element producing modules. Thus, a computer can be used to generate control voltages, but, more importantly, the videographer has intimate control of the image through various physical-to-control voltage transducers. (I hope to include bioelectronic transducers also.)

Operation

By patching desired modules together at the control panel of the synthesizer, as in Figure 6, and supplying appropriate control voltages to control ports a given passage of images may be executed. Some modules generate and manipulate forms, while other modules impart differing textures to forms, or independently control the various layers of the total image. Camera signals may be processed through the synthesizer also. (Fig. 4)

The synthesizer accepts video sync and drive pulses as "Backdoor" inputs and delivers parallel RGBY (red, green, blue, luminance) outputs to the video encoder. This makes it possible to use the synthesizer with various video formats by substituting sync generators and encoders, an important element of flexibility. The present version produces NTSC compatible color video.

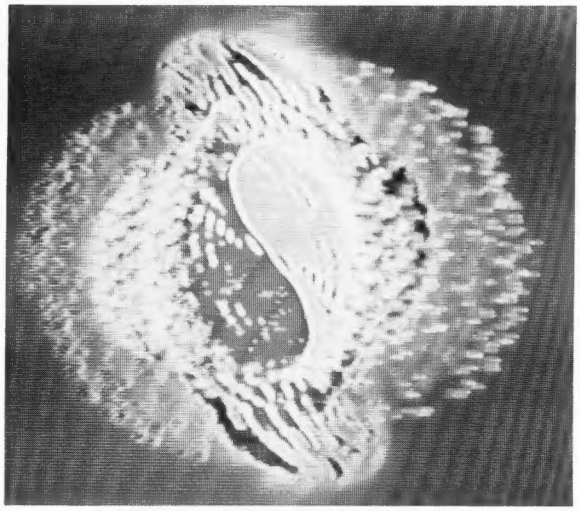

Figure 1 Synthesized Image.

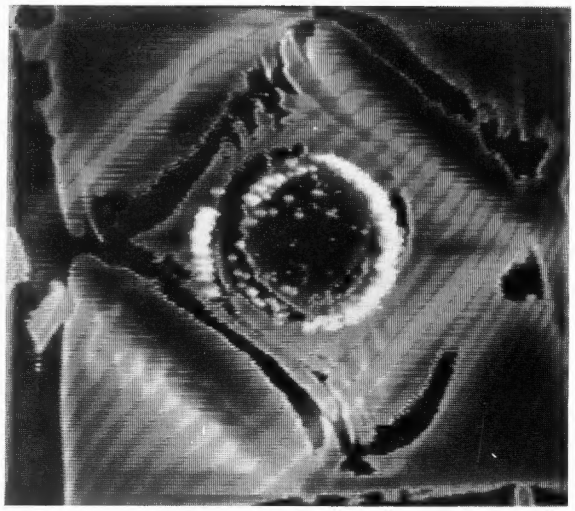

Figure 2 Synthesized Image.

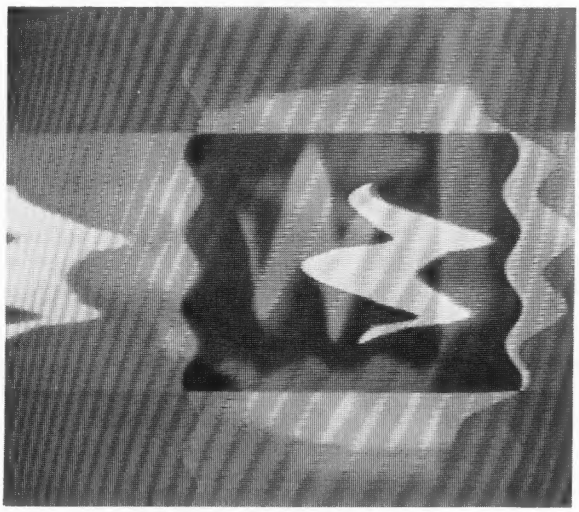

Figure 3 Synthesized Image.

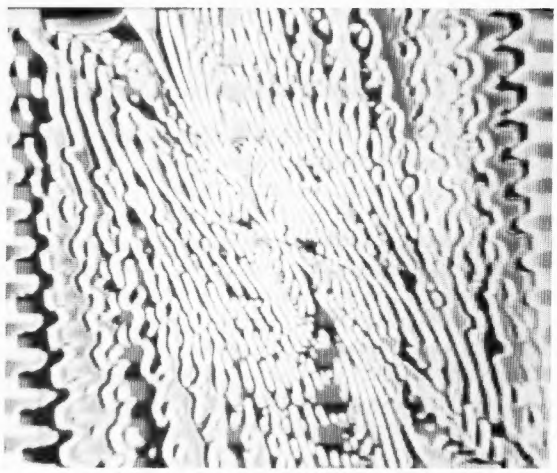

Figure 4 Synthesized Image with camera source.

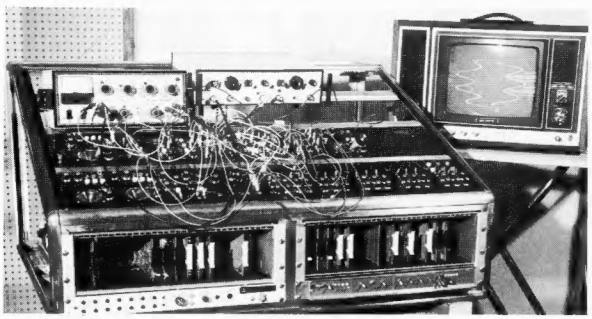

Figure 5 Prototype Direct Video Synthesizer.

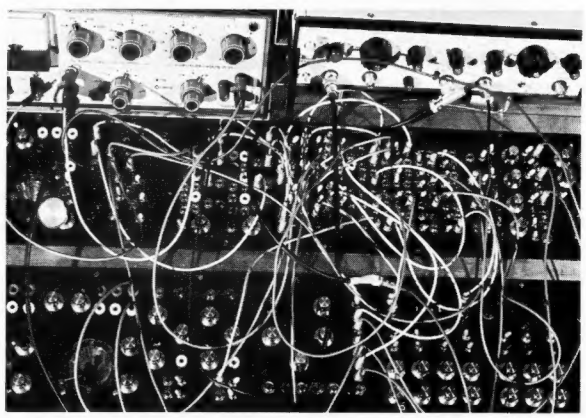

Figure 6 View of Control Panel.

Photo credit: M. d'Hamer.